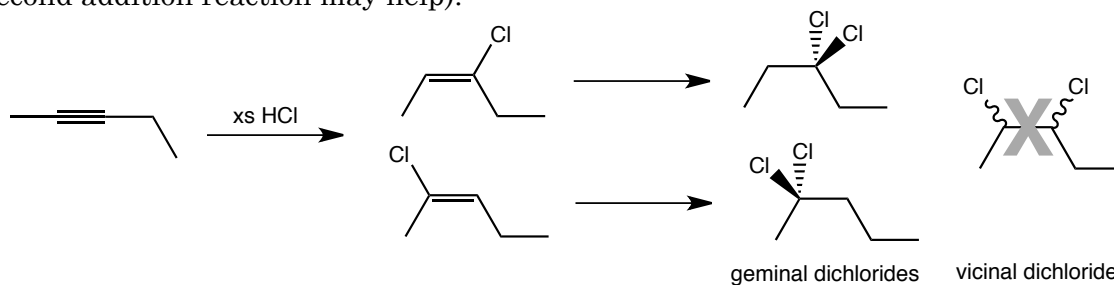


1. (10 pts.) When alkynes react with excess hydrochloric acid, a geminal dichloride forms, and the vicinal dichloride is not seen. This happens even when the alkyne is symmetrically substituted. Explain this observation (drawing the intermediate for the second addition reaction may help).



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

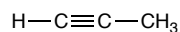
7. _____

8. _____

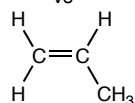
2. (10 pts.) Like alkenes, alkynes are nucleophiles. Explain why alkynes are nucleophilic.

9. _____

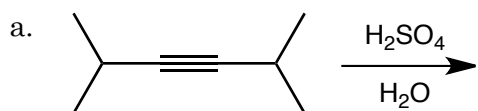
3. (8 pts.) It is much easier to deprotonate a terminal alkyne than it is to deprotonate a terminal alkene. Explain.



vs



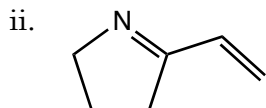
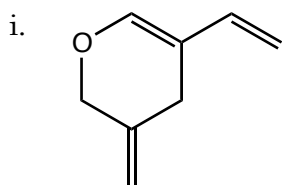
4. (6 pts. ea.) Predict the organic product(s) for the following reactions.



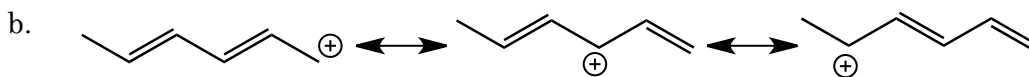
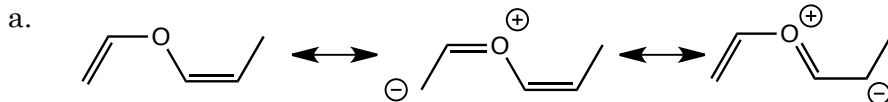
5. a. (6 pts. ea.) Draw resonance structures for the following molecules.

b. (4 pts. ea.) Rank the resonance structures in order of decreasing stability. If any insignificant contributors to the resonance hybrid are drawn, label them as such.

c. (4 pts. ea.) Circle the structure that the resonance hybrid would most resemble.



6. (6 pts. ea.) For each set of resonance structures below, draw the resonance resonance hybrid. Remember to indicate partial charges where appropriate.

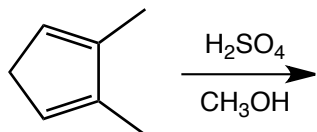


7. a. (6 pts. ea.) Predict the products of the following reactions.

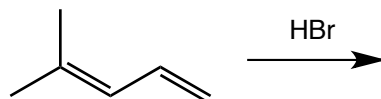
b. (2 pts. ea.) Label the kinetic product.

c. (2 pts. ea.) If one of the products would be favored under thermodynamic conditions, label it.

i.

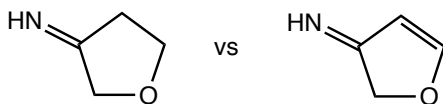


ii.

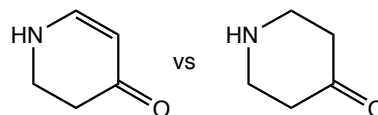


8. (6 pts. ea.) For each pair of molecules, identify the stronger base, and explain why the chosen base is the stronger one.

a.



b.



9. (6 pts.) Draw a mechanism for the following reaction, and (4 pts.) explain why the rearrangement occurs.

